Algebra 2 ANSWER KEY

Unit 2b Review – Polynomial Functions

Name: ______________________

Date: ______________ Pd: ______

Put each polynomial in standard form. Then determine the degree, number of terms, end behavior and number of u-turns (humps).

1) $y = -9x^2(2x + 4x^3 - 9x^2)$

$-18x^3 - 36x^5 + 81x^4$

Stand. Form: $-36x^5 + 81x^4 - 18x^3$

Degree: 5 Terms: 3

End. Beh: ↑↓ U-turns: 4

odd ⊖

2) $y = (3x^2 - 7)(x^2 + 2)$

$3x^4 + 6x^2 - 7x^2 - 14$

$3x^4 - x^2 - 14$

Stand. Form: $3x^4 - x^2 - 14$

Degree: 4 Terms: 3

End. Beh: ↑↑ U-turns: 3

even ⊕

Solve each of the following polynomials.

3) $x^4 - 8x^3 + 12x^2 = 0$

$x^2(x^2 - 8x + 12) = 0$

$x^2(x - 6)(x - 2) = 0$

$x^2 = 0$ | $x - 6 = 0$ | $x - 2 = 0$

$x = 0, 0$ | $x = 6$ | $x = 2$

Roots: 0, 0, 6, 2

4) $12x^3 = 10x^2 + 8x$

$12x^3 - 10x^2 - 8x = 0$

$2x(6x^2 - 5x - 4) = 0$

$(6x^2 - 8x)(+3x - 4)$

$2x(3x - 4) + 1(3x - 4)$

$2x(2x + 1)(3x - 4) = 0$

$2x = 0$ $2x + 1 = 0$ $3x - 4 = 0$

$x = 0$ $x = -\frac{1}{2}$ $x = \frac{4}{3}$

Roots: $0, -\frac{1}{2}, \frac{4}{3}$

Find the polynomial function, in standard form, given the following roots:

5) $x = 0, 4, -7$

$x(x-4)(x+7)$

$x(x^2+3x-28)$

x^3+3x^2-28x

Polynomial: $y = x^3+3x^2-28x$

6) $x = -2, -1, 8$

$(x+2)(x+1)(x-8)$

$(x^2+3x+2)(x-8)$

$\cancel{x^3}+\cancel{3x^2}+\cancel{2x}-\cancel{8x^2}+\cancel{24x}-16$

$x^3-5x^2-22x-16$

Polynomial: $y = x^3-5x^2-22x-16$

7) $x = 0, 0, 4, -5$

$x^2(x-4)(x+5)$

$x^2(x^2+x-20)$

$x^4+x^3-20x^2$

Polynomial: $y = x^4+x^3-20x^2$

8) $x = 2, -2, 5$

$(x-2)(x+2)(x-5)$

$(x^2-4)(x-5)$

$x^3-5x^2-4x+20$

Polynomial: $y = x^3-5x^2-4x+20$

Graph each of the polynomial functions. Be sure to fill in all of the requested information.

9) $y = -2x^3+8x^2-8x$

$-2x(x^2-4x+4)$

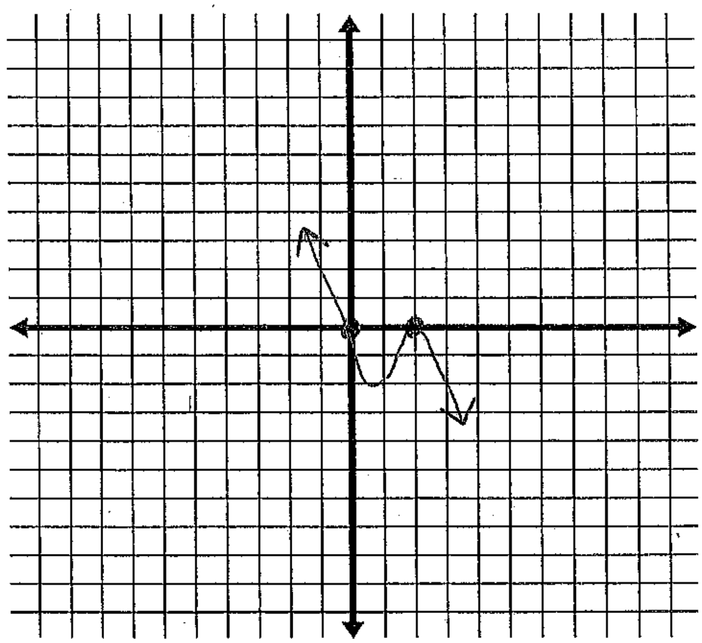
$-2x(x-2)(x-2)$

Zeros: 0, 2, 2

y-int: (0,0)

End Behavior: ↑↓

odd ⊖



10) $f(x) = x^3 - 7x^2 + 14x - 8$

Maximum # of roots: 3

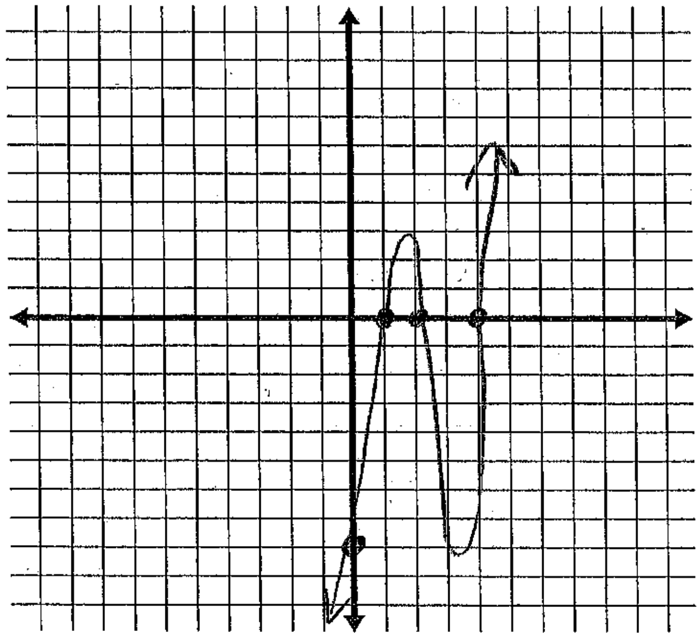
Possible rational roots: ±1, ±2, ±4, ±8

Factored form: $(x+1)(x-4)(x-2)$

Actual roots: 1, 4, 2

y-intercept = (0, -8)

EB: ↓ left, ↑ right.



Workspace:

1)	1	-7	14	-8
	↓	1	-6	8
	1	-6	8	0

$x^2 - 6x + 8$

$(x-4)(x-2)$

11) $f(x) = x^4 - 4x^3 - 13x^2 + 4x + 12$

Maximum # of roots: 4

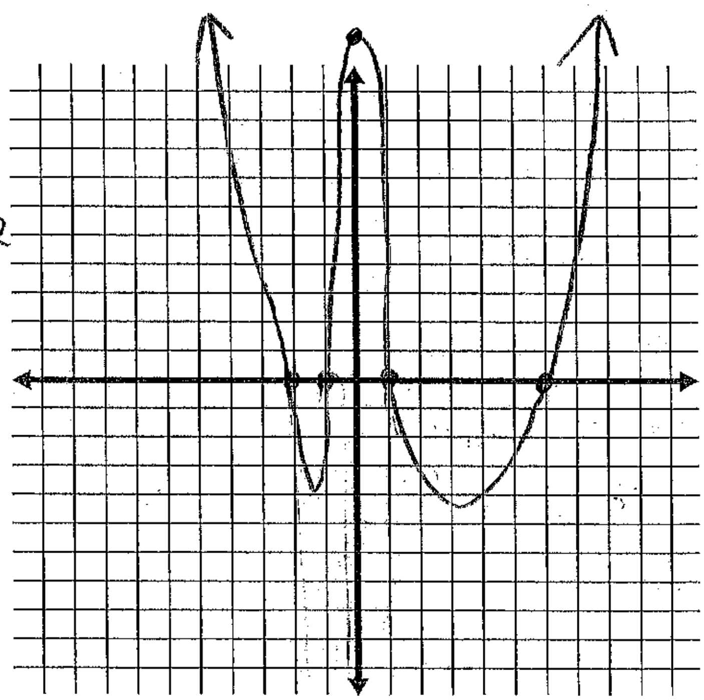
Possible rational roots: ±1, ±2, ±3, ±4, ±6, ±12

Factored form: $(x-1)(x+1)(x-6)(x+2)$

Actual roots: 1, -1, 6, -2

y-intercept = (0, 12)

EB: ↑ left, ↑ right.



Workspace:

1)	1	-4	-13	4	12
	↓	1	-3	-16	-12
-1)	1	-3	-16	-12	0
	↓	-1	4	12	
	1	-4	-12	0	

$x^2 - 4x - 12$

$(x-6)(x+2)$

12) $f(x)=2x^4-11x^3-6x^2+64x+32$

Maximum # of roots: 4

Possible rational roots: $\pm1, \pm2, \pm4, \pm8, \pm16, \pm32, \pm\frac{1}{2}$

Factored form: $(x+2)(x-4)(2x+1)(x-4)$

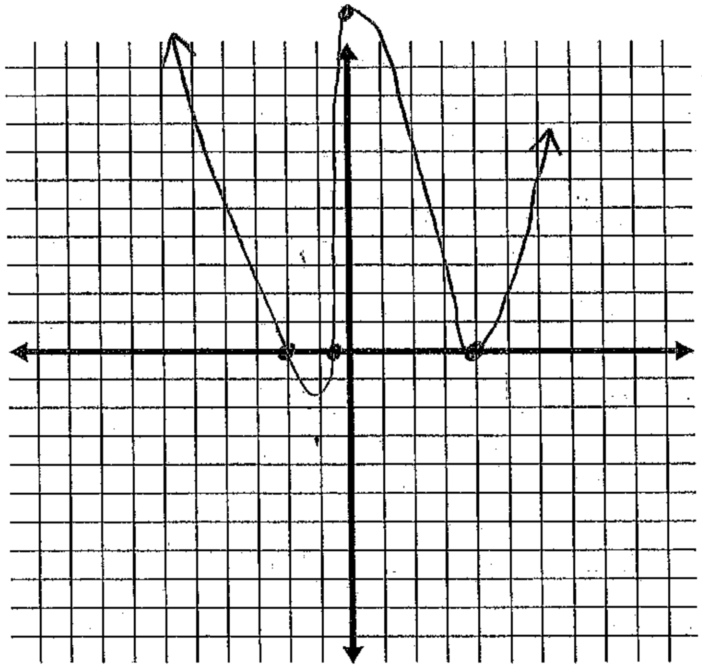
Actual roots: $-2, 4, -\frac{1}{2}, 4$

y-intercept = $(0, 32)$

EB: ↑ left, ↑ right.

Workspace:

-2	2	-11	-6	64	32
	↓	-4	30	-48	-32
4	2	-15	24	16	0
	↓	8	-28	-16	
	2	-7	-4	0	



$2x^2-7x-4$

$(2x+1)(x-4)$

13) $f(x)=x^3-12x+16$

Maximum # of roots: 3

Possible rational roots: $\pm1, \pm2, \pm4, \pm8, \pm16$

Factored form: $(x-2)(x-2)(x+4)$

Actual roots: $2, -4, 2$

y-intercept = $(0, 16)$

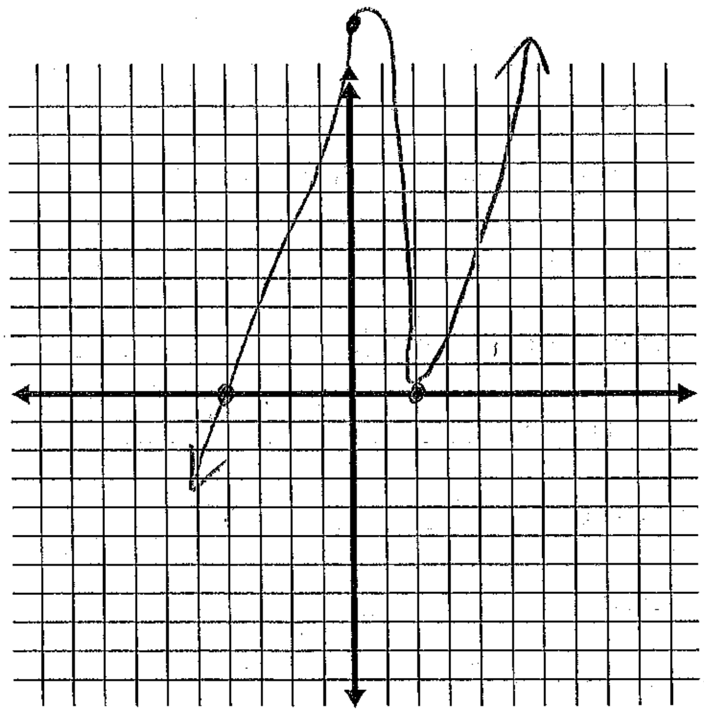
EB: ↓ left, ↑ right.

Workspace:

2	1	0	-12	16
	↓	2	4	-16
	1	2	-8	0

x^2+2x-8

$(x+4)(x-2)$



Find the requested information:

14) One factor of $f(x) = 4x^3 + 28x^2 - 9x - 63$ is $(x + 7)$. What are the other two **factors**?

$$\begin{array}{r|rrrr} -7 & 4 & 28 & -9 & -63 \\ & \downarrow & -28 & 0 & 63 \\ \hline & 4 & 0 & -9 & \llcorner 0 \end{array}$$

$4x^2 - 9$

$(2x+3)(2x-3)$

Factors: $(2x+3)(2x-3)$

15) The function $f(x) = x^3 - 3x^2 - 28x + 60$ has three x-intercepts. One of the intercepts occurs at $x = -5$. What are the other two **x-intercepts**?

$$\begin{array}{r|rrrr} -5 & 1 & -3 & -28 & 60 \\ & \downarrow & -5 & 40 & -60 \\ \hline & 1 & -8 & 12 & \llcorner 0 \end{array}$$

$x^2 - 8x + 12$

$(x-6)(x-2)$

$x-6=0 \quad x-2=0$

$x=6 \quad x=2$

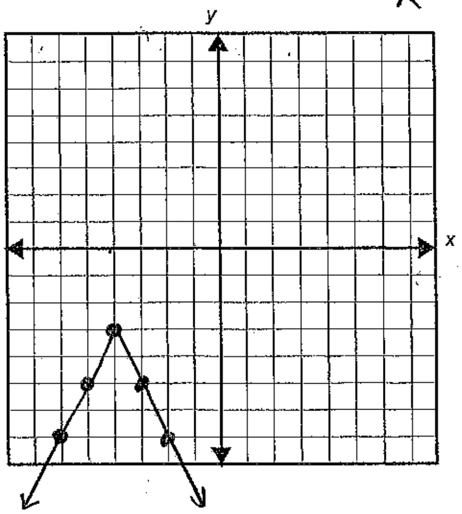
x-intercepts: 2, 6

Cumulative Questions:

Graph the following functions using the grids below.

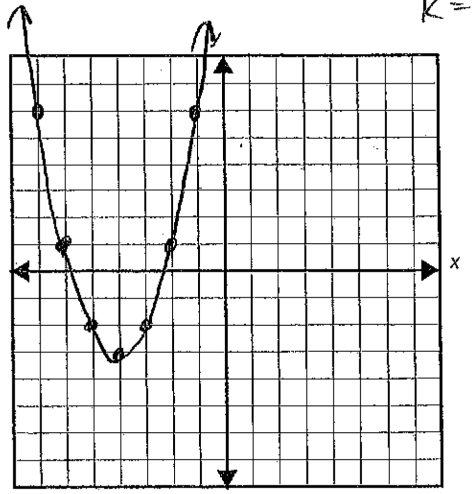
16) $y = -2|x+4| - 3$

$a = -2$
$h = -4$
$K = -3$



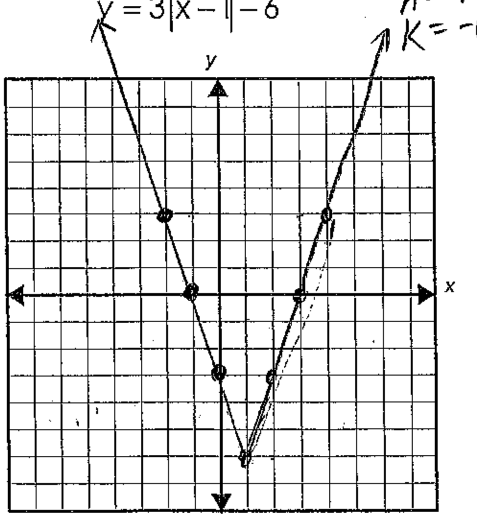
17) $y = (x+4)^2 - 3$

$a = 1$
$h = -4$
$K = -3$



18) $y = 3|x-1| - 6$

$a = 3$
$h = 1$
$K = -6$



19) $y = -\frac{1}{2}(x+6)^2 + 4$

$a = -\frac{1}{2}$
$h = -6$
$K = 4$